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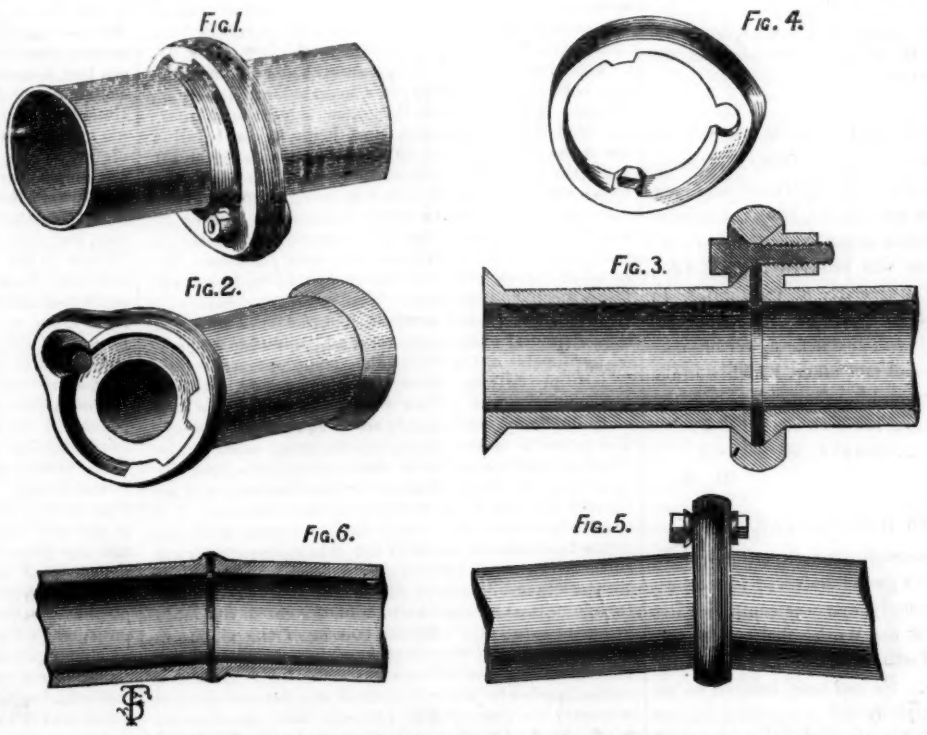
Smith's Patent Gas and Water Pipe Coupling.

The principal advantages claimed for this coupling are greater economy in laying, jointing, and replacing pipes, together with lightness of joints, and allowance for contraction and expansion of metal, which will be readily seen by the accompanying drawings; also that pipes of this construction can be laid at a much less cost than any heretofore. There is no excavating below the joint, for their formation, thus avoiding the necessity of man holders, etc., while the ease with which the pipes may be removed, by simply unscrewing the bolt and disconnecting the coupling ring, at once does away with the loss at present entailed by the destruction of many pipes when they are required to be replaced, or a length of pipe taken out and replaced by a new one with T or otherwise. There is also a great saving in the weight of pipe, being cast without sockets, and the expense of turning and boring in the one sort, and lead, fire, etc., and trenches, etc., in the other sort; but the ease with which pipes may be laid or replaced, and the lightness of the joint will be items of the greatest consideration to the practical engineer.

Referring to the accompanying drawings they show the different forms used for cast iron pipes, as seen at figs. 1, 2, and 3. The pipes are perfectly straight, with the exception of a bevelled ring cast on each end, and are connected in the following manner: The bevelled end of the pipes are placed into the coupling ring with the wedge like clips, fig. 4, also a ring or gasket of rubber or any other suitable material, as shown in figs. 2 and 3, and when fastened together by the simple wedge-like form (nut and bolt fully shown in figs. 3 and 5) it becomes a secure, perfect, unleakable joint. The ends of the pipes by being cast slightly on the bevel, when placed together, as shown at figs. 5 and 6, forms a slight curve, and in thus placing a few lengths the use of various bends may be avoided, and by reversing the pipe it becomes straight, as shown at figs. 1, 2 and 3. Fig. 2 shows the coupling ring on one end of the pipe, and is fastened together in a like manner, as shown at figs. 1 and 3.

By a simple combination, not shown here, of a short tube ending in two coupling rings, with suitable washers or gaskets and beveled rings, a broken pipe may be readily mended; or the same device is applicable to either wood, asphalt, or any other pipe having plain ends, and can be applied it is said, at one quarter the cost of barrel unions for any kind of pipe or tubing. We shall illustrate this valuable device hereafter.

For further information, for rights to manufacture, etc., please address E. SANDERSON, agent, 42 Pine street, Room 18, New York.



SMITH'S PATENT GAS AND WATER PIPE COUPLING.

This improvement was recently patented through our agency. We deem it a very important invention, and likely to become a very popular coupling for all kinds of piping. The facility and economy of applying it, and the simple, novel, and effective method of deflecting or laying pipe in curved or irregulrr lines for river bottoms and the like, is sure to commend it to the practical mechanic and engineer.

The patentee is a resident of Germany, and we understand it is being much employed in that country, and recently received the prize medal at the International Exhibition held at Hamburgh.

What the Telescope is Doing.

One of the largest telescopes in the world, it is well known is owned by the Chicago University. The destined work of this wonderful instrument is to make, in connection with nine chief observations of Europe and America, an entirely new catalogue of 250,000 stars, determining the right ascension and declination of each particular star; so that by observing its position, astronomers may, in far-off ages, be able to announce authoritatively on its motion, and to declare in what direction it has proceeded through the illimitable voids. At this moment it is slowly and surely performing its sublime work, and furnishing those far-off astronomers the data upon which to base their calculations respecting that mighty problem, the direct motion of the sun through space.

When this is solved, data will also be abundant for locating the position of the great central sun, around which millions upon millions of other suns popularly denominated stars, do, in all probability, revolve. The labor being divided among the ten principal observatories in the world, will make the share of it falling to the Chicago Observatory, 25,000 stars—upon each one of which the most careful observations will be made and recorded. It will require about ten years to accomplish this stupendous work, and when it is done we may expect some most important astronomical discoveries.—*Sci. American.*

By digesting metallic zinc in iodide of ethyl we obtain a volatile liquid which takes fire spontaneously in the air. It can be distilled in an atmosphere of hydrogen, and if this gas be made to pass through the liquid it will carry off some of the zinc ethyl, and when ignited will burn with a magnificent white flame. It is probable that ordinary illuminating gas would answer as well as hydrogen for this experiment. The light produced in this way can be employed to take photographs, but its actinic properties are not equal to the effects produced by burning magnesium.

Chemical Repertory.--No. 31.

JUNE 2, 1870.

Editor—HENRY WURTZ.

SPECIAL EDITORIAL NOTE.

In consequence of repeated and annoying misapprehensions, it is necessary to repeat here the announcement (which has stood under the general editorial heading since my connection with the Journal, but has apparently escaped the notice of many), that I wholly repudiate responsibility for, and have even no necessary knowledge of, any thing that is not over or under my own name or initials.

HENRY WURTZ.

Gasterei.

The following is from one of our "funny papers": If we could, we should reproduce the illustrations which, however, are rather ghastly, such, for example; as a monumental gas-lamp burning over a grave, a combined gas-works and cemetery, etc., etc. We are not informed whether the Frenchman is a Gascon, but are pretty sure that his claim may be classified as gasconade.

The whole subject is certainly not of an appetizing or gastronomic kind, but rather calculated to produce commotion in the gastric regions—H. W.

ALL FLESH IS GAS.

An ingenious Frenchman has discovered that an excellent illuminating gas may be made from—not to put too fine a point upon it—the ashes of our ancestors. In a pamphlet published in Paris this truly Gallic idea is broached, and we are recommended to cease burying our Pa's and Ma's as a wasteful and extravagant practice. We are henceforth to utilize their *restes*—convert them through this method into gas and light our streets and houses with them. Upon this plan—supposing it feasible—a gas works and a cemetery would be convertible terms, and doubtless some of our enterprising citizens will, ere long, start a company to work the patent.

As a necessary result we shall be having mortuary gas lamps—cemeteries being superseded an ordinary street light may be made to commemorate a departed comrade, and for domestic purposes a new style of burner will be called for. We subjoin a few hints as designs to lamp manufacturers.

HEATS OF FLAMES OF ETHER AND ALCOHOL.

In the REPERTORY No. 27, April 2, 1870, Prof. SILLIMAN and myself inserted a note to our Memoir on Flame Temperatures, printed in part in No. 25 of the REPERTORY (and in the May number of the *Amer. Jour. of Sci*) in which a communication was referred to from Prof. JOHN LE CONTE, of the University of California. In that communication Prof. LE CONTE gives the results of computations by himself of the calorific power or effectiveness of flames of alcohol and ether, which we take the liberty here to record on his behalf—

Alcohol..... 1596° C. = 2905° F.
Ether.....2049° C. = 3720° F.

H. W.

SULPHUR IN STREET GAS.

[The editor has noticed within his experience, more than one instance in which gas as delivered to consumers tinged lead paper strongly, and was complained of as maladorous, whereas at the Works the purification was apparently managed with care, and the gas directly from the purifiers sweet. He has been induced to believe that some of the sulphuretted compounds known to exist in gas, which do not tinge the test-paper and are not taken out by iron or even by lime, may undergo afterwards *spontaneous* decomposition, with formation of sulphuretted hydrogen or rather of sulphide of ammonium, and he does not now resign this belief; but what he now wishes to ask of our Gas Managers is whether the following does not indicate one method by which such a result could readily occur, without constant and competent *chemical* supervision or inspection of their purifying operations; and has not this accident often led to inexplicable, annoying and *persistent* complaints on the part of their customers? The extract is from the evidence of that eminent Gas-Chemist, Dr. LETHEBY, before an Engliah Parliamentary Commission; given April 1, 1870; and relating to a case of this kind, similar to the one hec ites from his own experience, which occurred at Rotherham; and which was investigated by another chemist, Mr. A. H. ALLEN. H. W.]

Dr. LETHEBY, examined by Mr. RICHARDS.

"I am the chief gas examiner appointed by the Board of Trade for the metropolis. I have heard Mr. Allen's evidence. Last October, the gas supplied by the Great Central Gas Company showed a quantity of sulphuretted hydrogen, which, from an accident, had been absorbed by the water in the tank; and it took four months to eradicate it. I therefore exonerated the company from the fines to which they were liable. If, from the purifier not acting, foul gas gets into the gasholder, it so taints the water that sulphuretted hydrogen may exist in the gas for a long time. The results of Mr. Allen's examinations show a very small proportion of sulphur. In London there are frequently 20 grains in 100 feet. The ammonia in the gas at Rotherham is also very low, as 5 grains are considered a fair quantity. Copperas is quite a proper material for use in purification, if properly managed; but unless used with sawdust there may be accidents."

American Chemical News.

The *American Journal of Science* for May, 1870, is particularly rich in matter of interest coming within our province, and we cannot resist the temptation to appropriate some items therefrom.—H. W.

ON A SIMPLE METHOD OF AVOIDING OBSERVATIONS OF TEMPERATURE AND PRESSURE IN GAS ANALYSES.

Read before the National Acad of Sciences, Sept. 1869.

By WOLCOTT GIBBS, M. D., Prof. in Harvard University.

In absolute determinations of nitrogen and other gases, accurate observations of temperature and pressure are, in the ordinary methods of analysis, necessary, and when made require subsequent calculations which, when the analyses are numerous, become rather tedious. By the following simple method these observations may be altogether dispensed with and the true weight or the reduced volume of the observed gas obtained at once by a single arithmetical operation.

* * * * * * * *

A graduated tube holding about 150 cubic centimeters is filled with mercury and inverted into a mercury trough. Two thirds or three fourths of the mercury are then displaced by air, care being taken to allow the walls of the tube to be slightly moist, so as to saturate the air. This tube may be called the companion tube; the volume of air which it contains must be carefully determined in the usual manner by five or six separate observations, taking into account, of course, all the circumstances of temperature and pressure. The mean of the reduced volumes is then to be found, and forms a constant quantity. The gas to be measured is transferred from the receiver in which it is collected, into a (moist) eudiometer tube, which is then suspended by the side of the companion tube, and in the same trough or cistern. Both tubes being supported by cords passing over pullies, it is easy to bring the level of the mercury in the two tubes to an exact coincidence. The pressure on the gas is then the same in each tube. The temperature is also the same, as the tubes hang side by side in the room set apart for gas analyses, and are equally affected by any thermometric change. It is then only necessary to read off the volumes of the gas in the two tubes to have all the data necessary for calculating the weight of the gas to be measured, * * As the observed volume of the air in the companion tube is to the observed volume of the gas in the measuring tube, so is the reduced volume of the air in the first—previously determined as above—to the reduced volume of the gas to be measured. This method of course applies to the reduction of any gaseous mixture whatever to the normal pressure and temperature. * * * * In practice, a companion tube filled with mercury will last with a little care for a very long time. Even when filled with water I have found that excellent results may be obtained, and that the tube will last for some weeks. Williamson and Russell, in their processes for gas analysis, have employed a companion tube for bringing a gas to be measured to a constant pressure, but the application made above is, I believe, wholly new.

[Some observations on this method of Dr. GIBBS are reserved for a future issue.—H. W.]

There is also an account of a lecture by Dr. CARPENTER to the Royal Institution, on the results of *Deep Sea Dredging* in 1869, from which we take the following passage, as of more or less interest in connection with our own specialties. It relates to the analyses of the gases contained in the ocean waters.

Samples were collected not only at the surface, under a great variety of circumstances, but also from great depths; and the gases expelled by boiling were subjected to analysis according to the method of Professor W. A. Miller—the adaptation of his apparatus to the exigencies of ship-board having been successfully accomplished during the first cruise by Mr. W. L. Carpenter. The general average of thirty analyses of surface-water gives the following as the percentage proportions:—25·1 oxygen, 54·2 nitrogen, 20·7 carbonic acid. This proportion, however, was subject to great variations, as will presently be shown. As a general rule, the proportion of oxygen was found to diminish, and that of carbonic acid to increase with the depth; the results of analyses of *intermediate* waters giving a percentage of 22·0 oxygen, 52·8 nitrogen, and 26·2 carbonic acid; while the results of analyses of *bottom*-waters gave 19·5 oxygen, 52·6 nitrogen, and 27·9 carbonic acid. But *bottom* water at a comparatively small depth often contained as much carbonic acid and as little oxygen as *intermediate* water at much greater depths; and the proportion of carbonic acid to oxygen in *bottom*-water was found to bear a much closer relation to the abundance of animal life (especially of the more elevated types), as shown by the dredge, than to its depth. This was very strikingly shown in an instance in which analyses were made of the gases contained in samples of water collected at every fifty fathoms, from 400 fathoms to the bottom at 862 fathoms, the percentage results being as follows:

	750 Fath.	600 Fath.	Bottom, 862 Fath.
Oxygen.....	18·8	17 8	17·2
Nitrogen.....	49·3	48 5	34·5
Carbonic acid...	31·9	33·7	48·3

The extraordinarily augmented percentage of carbonic acid in the stratum of water here immediately overlying the sea-bed was accompanied by a great abundance of animal life. On the other hand, the lowest percentage of carbonic acid found in bottom-water, viz: 7·9, was accompanied by a "very bad haul." In several cases in which the depths were nearly the same, the analyst ventured a prediction as to the abundance or otherwise, of animal life, from the proportion of carbonic acid in the bottom-water; and his prediction proved in every instance correct.

It would appear, therefore, that the increase in the proportion of carbonic acid, and the diminution in that of the oxygen, in the abyssal waters of the ocean, is due to the respiratory process, which is no less a necessary condition of the existence of animal life on the sea-bed, than is the presence of food-material for its sustenance. And it is further obvious that the continued consumption of oxygen and liberation of carbonic acid would soon render the stratum of water immediately above the bottom completely irrespirable—in the absence of any antagonistic process of vegetation—were it not for the upward diffusion of the carbonic acid through the intermediate waters *to the surface*, and the *downward* diffusion of oxygen *from* the surface to the depths below. A continual interchange will take place *at* the surface between the gases of the sea-water and those of the atmosphere; and thus the respiration of the abyssal fauna is provided for by a process of diffusion, which may have to operate through *three miles* or more of intervening water.

The varying proportions of carbonic acid and oxygen in the *surface*-waters are doubtless to be accounted for in part by the differences in the amount and character of the animal life existing beneath; but a comparison of the results of the analyses made during the agitation of the surface by wind, with those made in calm weather, showed so decided a reduction in the proportion of carbonic acid, with an increase in that of oxygen, under the former condition, as almost unequivocally to indicate that superficial disturbance of the sea by atmospheric movement is absolutely necessary for its purification from the noxious effects of animal decomposition. Of this view a most unexpected and remarkable confirmation has been afforded by the following circumstance: In one of the analyses of surface-water made during the second cruise, the percentage of carbonic acid fell as low as 3·3, while that of oxygen rose as high as 37·1; and in a like analysis made during the third cruise, the percentage of carbonic acid was 5·6; while that of oxygen was 45·3. As the results of every other analyses of surface-water were in marked contrast to these, it became a question whether they should not be thrown out as erroneous; until it was recollected that, while the samples of surface water had been generally taken up from the *bow* of the vessel, they had been drawn in these two instances from *abaft the paddles*, and had thus been subjected to such a violent agitation in contact with the atmosphere, as would preeminently favor their thorough aëration.

Hence, then, it may be affirmed that every disturbance of the ocean-surface by atmospheric movement, from the gentlest ripple to the most tremendous storm-wave, contributes, in proportion to its amount, to the maintenance of animal life in its abyssal depths—doing, in fact for the aëration of the fluids of their inhabitants,

just what is done by the heaving and falling of our own chests for the aëration of the blood which courses through our lungs. A perpetual calm would be as fatal to their continued existence, as the forcible stoppage of all respiratory movement would be to our own. And thus universal stagnation would become universal death.

[In this issue of the *American Journal of Science* appear also not less than four papers which have already been presented to our readers through these columns; namely, the Editor's paper upon the *Ontario County Gas Well;* SILLIMAN and WURTZ on *Flame Temperatures;* and Mr. LOEW's two papers on the *Formation of Ozone during Rapid Combustion* and on the *Action of Sunlight on Sulphurous Acid.*—H. W.]

[In connection with the above, the following upon the same subject, cut from an exchange, is pertinently appended.—H. W.]

MR. J. HUNTER has analysed sea-water from various depths. The water was collected by fastening to the sounding-line a large brass cylinder, provided at top and bottom with valves opening upwards. During the sinking of the cylinder the water passed through; when the cylinder was raised the valve closed, and a sample of the water was thus captured from the lowest depth to which the cylinder had sunk. The observations were made at intervals of 250 ft. down to a depth of 2090 ft. The temperatures were found to vary from 50.5 deg. at 250ft., to 36.4 deg. at 20 0ft., the decrease being very rapid at first, but at a lower depth scarcely appreciable. The specific gravity was 1.0275 at the surface, and the same at 1000, 1250, 1500, and 1750ft. respectively, while at 750 and 2090ft it was 1.0273, and at 250 and 500ft.., 1,0274. The number of grammes of oxygen per 250 c. c. varied very irregularly, being greatest at 1500 ft., viz., 0017, and smallest at 750ft., 0006. The total quantity of gas per 100 c. c. also varied irregularly, the largest quantity, 2.90, being at 1254, and the smallest, 2.20, at 750ft. With respect to the composition of the disolved gas, the proportion of carbonic acid was very large, and increased (with little exception) proportionately to the depth, from 25. 12 at 250ft. to 35.92 per cent. at 2090ft·; the proportion of nitrogen and oxygen decrease *pari passu*, that of the former nearly regularly from 52.42 at 250., to 43.54 per cent. at 2090ft.; while the decrease in the oxygen was less regular, being 22.46 at 250ft but had increased to 20-70 per cent at 1650ft., and 20.54 per cent. at 2090 ft. The locality of the observations was lat. 47 deg. 39 min. N., long. 11 deg 33 min. W.; the date July 23rd, 1869.

[*Original Communication.*]

At a meeting of the *Society of Arts* of the Massachusetts INSTITUTE OF TECHNOLOGY, Prof. E. C. PICKERING showed the apparatus used in his Physical Laboratory in giving instructions on photometry and gas measurement. For determining the absorption of light passing through a glass or other transparent medium, the two lights of a Bunsen photometer are replaced by the images of a candle reflected in two mirrors, whose relative intensity is thus absolutely constant. Several new points are now being investigated by the classes of the institute, who thus learn to use this and other instruments. Each experiment is repeated several times on successive days by different students, and thus an amount of work is accomplished which it would take months for a single person to perform. A standard gasholder has been tested to see if the so-called cycloid rendered the pressure perfectly uniform, extreme accuracy being attained by a modification of the hook gauge, such as is used in hydraulic experiments. This instrument was also used in determining the errors of the common gauge with float and wheel, and a modification of it was shown, which was so delicate that the continual lowering of the surface of a vessel of water by evaporation was rendered very perceptible.

CHEMICAL EXCERPTA.

On the Combination of Hydrogen with Sulphur.—MERZ and WEITH have communicated to the German Chemical Society the observation that the prevalent belief in the incapacity of hydrogen to unite directly with sulphur, is erroneous. When hydrogen is passed over boiling sulphur, sulphuretted hydrogen is produced in abundance. Sulphur also acts on boiling *aniline*, also on *glycerine, naphthaline*, etc., with formation of HS.

[These facts doubtless have their importance in connection with the gas manufacture, especially from coals containing much sulphur, as pyrites; like our rich West Virginia Gas Coals, for example, and some of those from Nova Scotia.—H. W.]

INTERNAL REVENUE RETURNS.

[The following is excised from the daily papers, being what is represented as the make of gas of these several Works for the month of April, 1870. With regard to the Hoboken Company, there is obviously a mistake or misprint.—H. W.]

NEW YORK GAS COMPANIES.

	Cubic feet.
Metropolitan	27,761,484
Harlem	8.574.710
New York City	45,762,123
Manhattan	103,537,924
	185,636,246

NEW JERSEY GAS COMPANIES.

	Cubic feet.
Orange Gas Co	531,400
Newark Gas Co	3,337,000
Hudson County Co	5,261,600
People's Co., Jersey City	1,472,735
Hoboken Co	15.307,200

ACKNOWLEDGMENT.

Professor WALLING's third rejoinder to Dr. VAN DER WEYDE, came too late for publication in this issue of the Journal, but will appear in our next.

Improvement in Steam Generators.

Whether that desideratum, as yet "far off, unattained, and dim,"—the time when steam boilers shall be perfectly safe—will ever come, we cannot say; but from across the water there is cheering token of improvement in the matter indicated. The latest monthly report of the "Manchester Steam Users' Association" thus presents the subject from an English point of view:

"On the whole, the general standard of boilers is improving. A greater number of furnace tubes are constructed with encircling hoops, flanged seams, or other suitable appliances for preventing collapse, nnd with the longitudinal joints welded instead of riveted, while the shells are more generally double riveted at the longitudinal seams, and less frequently weakened at the base of the steam-dome by a large opening. In many boilers steam domes are now discarded altogether, internal anti priming pipes being substituted for them with advantage, both on the score of strength and convenience. Added to this, the boiler ends, instead of being in two or more plates riveted together, are made in one piece, those for the fronts being turned up at the outer edges, one bored out to receive the furnace tubes—the special advantage of which is that it insures a true circular shape. Also, it is becoming a more general practice to equip every boiler with a separate steam-pressure guage, as well as with a duplicate glass water-guage and duplicate safety-valve—one of these safety-valves being of external dead weight pendulous construction, and the other adapted for blowing off at low water and high steam—while blow-out taps, made entirely of brass, and fitted with compound glands, are being adopted in the place either of taps, partly of brass and partly of iron, which are very objectionable, or instead of valves either of the disk or mushroom description. Surface blowing out also is becoming increasingly adopted. Feed valve-boxes are more generally attached to the boiler fronts, being placed on one side and above the level of the furnace crowns, where they are more accessible to the attendants, and too high to drain the furnace crowns bare, even should the valves fail and leakage take place. In setting boilers, 'midfeathers,' so conducive to external corrosion, are rapidly giving way to side walls, the boilers being bedded on suitable seating-blocks, holding them up out of the damp, and at the same time affording convenient access in the side flues. What are termed 'brick forefronts,' built in front of the boiler for the purpose of bringing the dead plate outside, and cramming into the furnace every possible inch of fire grate, have happily also been given up, since they concealed a considerable portion of the front end-plate, were always settling down out of shape and cracking, looking disreputable, and needing repair. Also, cast-iron furnace mouth-pieces, concealing the circle of rivets at the tube-end, are giving place to neat wrought-iron ones, finished off with a ring of brass, and leaving the rivets open to view. Flooring plates are now more frequently and with great advantage kept entirely below the front end-plate of the boiler, which prevents a good deal of corrosion occurring to it at the bottom, and leaves the whole open to view. The watchword of all boiler construction, equipment, and setting, should always be, and is becoming, 'everything above-board, open to view, and easy of examination.'"—*American Artisan.*

Comparison of the Refrigerative Effects of the Carre Apparatus and Common Ice.

By referring to the following tables, the immense economy realized in producing cold "dry" air by artificial refrigeration, over low "humid" temperatures obtained by the melting of ice, is most forcibly illustrated.

A No. 3 "Carré apparatus," the producing capacity of which is 5 lbs. of ice per minute, constructed by Messrs. I. P. Morris & Co., at the Port Richmond Iron Works, Philadelphia, yielded the following wonderful results, a short time ago, in presence of Professors Morton, Booth, Tilghman, and other scientific men, who had been invited to witness its operation.

The temperature of a closed room, measuring 3,375 cubic feet, was raised to 80 deg. Fah. by means of a stationary steam heater placed in it. A blower commenced to force cold air into this room from the refrigerating apparatus.

TIME.					Fah.
At 1·20,	when the thermometer	stood	at	80 deg.	Fah.
" 1·21,	"	"	"	76 "	"
" 1·22,	"	"	"	66 "	"
" 1·23,	"	"	"	58 "	"
" 1·24,	"	"	"	53 "	"
" 1·25,	"	"	"	50½ "	"
" 1·26,	"	"	"	48 "	"
" 1·27,	"	"	"	46 "	"
" 1·28,	"	"	"	45 "	"
" 1·29,	"	"	"	44 "	"
" 1·30,	"	"	"	43 "	"
" 1·31,	"	"	"	42 "	"
" 1·32,	"	"	"	41 "	"
" 1·33,	"	"	"	40 "	"
" 1·35,	"	"	"	39 "	"
" 1·37,	"	"	"	38 "	"
" 1·40,	"	"	"	37 "	"
" 1·44,	"	"	"	36 "	"
" 1·47,	"	"	"	35 "	"
" 1·56,	"	"	"	34 "	"
" 2·05,	"	"	"	32 "	"

During the trial, two glasses, one containing cold, and the other hot water, were placed at the opening of the inlet which conveyed the cold air into the room; the contents of the first was frozen to three-eighths of an inch thick in 12 minutes, while it required but 23 minutes to effect the same result with the latter, which had originally been at 140 deg. Fahrenheit.

At the close of the operation, the thermometers of the cooling box indicated fully as low temperatures as at the commencement, proving conclusively that the apparatus could indefinitely produce the same results. It is worthy of note that the steam heater was likewise cooled down to the temperature of the room.

The total amount of steam employed to supply heat, motive power, and water for the operation, was equivalent to less than 5 horse power.

On the following day the same room was heated to 80 deg. Fah., and the temperature then lowered to 46 deg. Fahrenheit by melting Portland ice.

The results obtained were as follows:

TIME.						Fah.
At 2·34,	when	1,054	lbs	ice were	weighed,	temp. was 80
" 2.36,	"	1,045	"	"	"	78
" 2·38,	"	1,038	"	"	"	70
" 2 39,	"	1,029	"	"	"	67
" 2·43,	"	1,024	"	"	"	72
" 2·46,	"	1,028	"	"	"	59
" 2·51,	"	1,012	"	"	"	56
" 2·58,	"	960	"	"	"	52
" 3·05,	"	948	"	"	"	49
" 3·15,	"	935	"	"	"	48
" 3.22,	"	920	"	"	"	48
" 3·25,	"	907	"	"	"	47½
" 3·30,	"	900	"	"	"	47
" 3·46,	"	880	"	"	"	46½
" 3·56,	"	868	"	"	"	45½
" 4·32,	"	815	"	"	"	46½
" 4·58,	"	760	"	"	"	46½
" 5·00,	"	754	"	"	"	46

At the last point it would have required such an increased quantity of ice to lower the temperature that the experiment was abandoned.

This last trial shows a loss of 300 lbs. of natural ice to reduce the temperature of a room from 80 deg. to 46 deg. Fah. in 2 hours and 26 minutes, which effect, in the first trial, had been obtained by Carre's apparatus in 7 minutes, with the same quantity of cold required to form 35 lbs. of ice; thereby showing that eight times as much ice were consumed to produce the same quantity of cold air as was supplied by the apparatus.

In both instances the room was placed under identical conditions for the comparative tests, the outside temperature having been perfectly excluded.

It is, therefore, evident that Carré's process, properly applied to industry, must entirely supersede the old system heretofore employed of melting ice, which only produces humid air, in such establishments as breweries, packing houses, paraffine, salt and chemical

works, and in other industries too numerous to mention.

From the above data, it may be safely calculated that "Carré's large and medium-sized apparatus can yield for from twenty cents to thirty cents the same quantity of 'dry' cold air as is given out by melting one ton of natural ice.

The Carré system being based on the chemical action of affinities does away with the intervention of immense exhausting and compressing gas pumps, which necessitate the aid of powerful steam engines and boilers. Moreover, the introduction of Carré's apparatus into industrial establishments, can in no manner vitiate the policies of insurance, the frigorific agent employed, *aqua ammonia*, being a "fire extinguisher," they can be worked with as little pressure and as great safety as steam machinery.—*Scientific American.*

A Table for Foretelling the Weather.

The following is Dr. Adam Clarke's famous table for foretelling the kind of weather throughout all the Lunations for each year for ever. If correct, it will be an invaluable friend to the farmer—and indeed to persons of almost every occupation. Try it:

TABLE.—The table and the accompanying remarks are the result of many years' actual observation, the whole being constructed on a due consideration of the attraction of the sun and moon, in the several positions respecting the earth, and will by a simple inspection, show the observer what kind of weather will most probably follow the entrance of the moon into any of its quarters, and that so near the truth as to be seldom or never found to fail.

MOON.	TIME OF CHANGE.	IN SUMMER.	IN WINTER.
If the New Moon, the First Quarter, the Full Moon, or the Last Quarter, happens	Between midnight and 2 in the morning.	Fair.	Hard frost, unless the wind be South or West.
	" 2 and 4, morning.	Cold, with showers,	Cold and stormy.
	" 4 and 6, "	Rain,	Rain.
	" 6 and 8, "	Wind and rain.	Stormy.
	" 8 and 10, "	Changeable.	Cold rain, if the wind be W. Snow, if E.
	" 10 and 12, "	Frequent showers.	Cold and high wind.
	At 12 o'clock, at noon, and 2 P. M.	Very rainy,	Snow or rain.
	Between 2 and 4, afternoon.	Changeable.	Fair and mild.
	" 4 and 6, "	Fair.	Fair.
	" 6 and 8, "	Fair, if wind N. W.	Fair and frosty, if wind N. or N. E.
	" 8 and 10, "	Rainy, if wind S. W.	Rain or snow, if S. or S. W.
	" 10 and midnight.	" " "	" " " "
	" 12 and 2 A. M.	Fair.	Fair and frosty.

Observations.—1. The nearer the time of the moon's change, First Quarter, Full, and Last Quarter, are to *midnight*, the fairer will the weather be during the seven days following. 2. The space for this calculation occupies from 10 at night till 2 next morning. 2. The nearer to *midday* or *noon* the phases of the moon happen, the more foul or wet weather may be expected during the next seven days. 4. The space for this calculation occupies from 10 in the forenoon to 2 in the afternoon. These observations refer principally to the Summer, though they affect Spring and Autumn nearly in the same ratio. 5. The moon's change, First Quarter, Full, and Last Quarter, happening during six of the afternoon hours, *i. e.* from 4 to 10, may be followed by fair weather; but this is mostly dependent on the wind, as noted in the table. 6. Though the weather, from a variety of irregular causes, is more uncertain in the latter part of autumn, the whole winter, and the beginning of spring, yet, in the main, the above observations will apply to those periods also. 7. To prognosticate correctly, especially in those cases where the wind is concerned, the observer should be within sight of a good vane, where the four cardinal points of the heavens are correctly placed. Within this precaution, be will scarcely ever be deceived in depending on the table.

The above is taken from "*The Old Franklin Almanac*" for 1870, published by A. Winch, 505 Chestnut street, Philadelphia, Pa.

Manufacture of Water Pipes.

There are few things in common use that need improvement more than pipes for conducting water, for the good are now too costly for many uses, and the cheap are commonly worthless for any purpose. As might be looked for, numerous methods of making and laying pipes have been proposed. The tin-lined lead pipe, claimed to be practically, as it certainly is theoretically, far superior to the old style of lead piping, has been the most assured success, but its expense precludes its employment for most conduits, except those designed for the immediate supply of dwellings. The same remark applies to wood and also to iron in a less though still considerable degree. Of the cheaper substitutes, such as canes waterproofed with coal-tar, and tubular sections made of artificial concrete, they are too lacking in strength to admit of their adoption under any great head or pressure of water. Aside from these and some other similar modes of pipe construction, there is that of making the conduits of some pliable material saturated with native bitumen, a method that has received much attention, and from which very excellent results are claimed to have been derived. Alderman Mechi, celebrated for his utilitarian ideas in connection with application of sewage in agriculture, states that he found on extended trial that pipes made of bitumenized paper were strong, durable, and efficient, and preferable in all respects to those made of wood or metal in the ordinary way.

The application of bitumen to this as to several other uses is a matter of importance in this country, for the reason that the great deposits of this material in California have almost wholly failed to prove available for the uses for which they were at one time believed to be adapted, and any new industry that leads to their practical use will simply make a staple article of trade and use from what is now almost a waste material. The manufacture of water-pipe on a method somewhat different from that practiced abroad with a similar product has indeed been commenced, but it is evident from the description given of the process, that some more economical substance should be used in connection with the bitumen, than the burlaps there employed.

In the process above referred to, the crude substance is first melted, to allow the earthy impurities to subside, and a small percentage of coal-tar is added to counteract the hardening that would otherwise result from the elimination of the volatile parts of the material when melted. The subsequent operation of forming the pipe consists simply in winding burlaps saturated with the melted substance upon a mandrel until the desired thickness is secured, the length of each pipe section being, of course, proportioned to the length of the mandrel, about twelve feet, on which it is formed, and the ready detachment of the section from the latter is provided for by previously winding upon the mandrel a thickness of stout paper. A smooth surface is given to the interior of the pipe by a simple operation which coats it with the bitumen, and it is then coated externally by being dipped in the last-named substance in a melted condition, and subsequently rolled upon a table in coke-dust. It is claimed that a ten-inch pipe constructed in this manner can be made to bear a pressure of five hundred pounds to the square inch. This, however, is not to be readily believed. The cost is given at twenty cents per inch for a two inch pipe, forty for a four-inch, and so on; but there is either some mistake in the statement, or the price is preposterously great for a conduit-pipe of this character. The true need in the utilization of the bitumen for this purpose, is the application of some material cheaper than either cloth or paper, that will give strength to the pipe, without involving much care or skill in the process of manufacture. It must be that such materials exist and are open to discovery. When once found they will give the production of bitumenized water-pipes a much more practical aspect than it now has: for the demand for a cheap and durable article of the kind is very great, and the supply of bitumen is in reality inexhaustible. Should, as might very possibly be the case, the carriage of the California material to the Atlantic portions of the country prove too great for profit, enough to meet all possible wants could be brought by sea from the Pitch Lake of Trinidad, concerning the possible industrial value of which Lord Dundonald wrote half a century ago, but which has been only an unused deposit of crude material to this day.—*American Artisan.*

Oxygen Gas in Disease.

The employment of oxygen gas as a remedy for disease has very greatly increased within a few years, and as our knowledge of its properties and effects progresses, the demand for a cheap method of its preparation is more urgently felt. Dr. Hudson (Andrew?) H. Smith, of this city, has recently published the results of his experiments with oxygen on the lower animals, and he also gives the action of the gas as a remedy in a large number of cases where it had been successfully prescribed.

It appears from all these operations, that a man can breathe pure oxygen almost indefinitely. The cases cited in opposition to this theory are all of them erroneous, inasmuch as the patient breathed not pure oxygen, but the products of his own respiration over again. Where pure oxygen was given there were no ill effects. Dr. Smith found that a mouse lived in pure oxygen four days, and would probably have survived indefinitely if provided with food. The animal was put under a bell jar upon a wire floor, with caustic potash to absorb the carbonic acid, and other arrangements for removing the moisture and organic matter issuing from the lungs. A constant supply of oxygen was kept up, and under these circumstances the mouse had no difficulty in breathing.

Dr. Smith found that the oxygen diminishes urea and destroys uric acid. It increases nutrition, and adds flesh, so that a person breathing it every day will grow fat. In cases of consumption it also aids nutrition and respiration, and persons whose lungs were badly diseased, and were in the last stages, have been kept alive by it long after they had been given up by the physicians. In cases of diphtheria, croup, asthma, and other diseases where respiration is difficult, great relief is afforded by oxygen gas. Instances are also recorded of the recovery by means of oxygen of persons who had been poisoned by opium, and very recently, also, by an overdose of hydrate of chloral. It is surprising to find how many cases have been relieved by oxygen gas where other remedies have failed. There are at the present time more than sixty persons in New York city, who are using oxygen gas under the advice of physicians, and the demand for it has increased so much that a regular office has been established for furnishing it in any quantity, with India rubber bags and all requisites for breathing it, just as medicine is dispensed by the apothecary. The gas is condensed in cylinders of various sizes, and is sold at the price of three dollars for one hundred gallons, which amount can be compressed into a cubic foot. It is quite a feature in the progress of applied science that oxygen gas becomes a commercial article, and that its price is brought down within the reach of many applications not hitherto conceived to be possible. Where the gas cannot be purchased as in New York, Dr. Smith recommends its manufacture from a mixture of chlorate of potash and black oxide of manganese, and he has devised a simple apparatus for this purpose. The mixture is put into a metallic tube closed at one end, and is heated in sections. As fast as one section has given off all of its gas the heat is moved and the gas expelled from a second portion. This avoids heating the whole mixture at once, and diminishes the chances of explosion. The gas is washed to free it from any chlorine or carbonic acid that might contaminate it, and is breathed through the nostrils from India rubber bags.

Dr. Smith's pamphlet has been reprinted by Messrs. D. Appleton & Co., and is a valuable contribution to our knowledge of oxygen.—*Jour. of Applied Chemistry.*

A Concrete from Gas Lime.

It is well known that gas companies turn out of their works a quantity of lime which has absorbed certain impurities from the crude gas. Hitherto, the only use found for this offensive smelling gas-lime, has been the very limited one of spreading it on the land and at the roots of trees for killing insects hurtful to vegetation. Of course this is out of the question in the case of the large city gas-works, whose plant is too far removed from fields and orchards, and, although it is acknowledged that gas can be better purified by lime than by any other material, the trouble of removal of the waste product has forced the adoption of other methods which do not involve so much expense in carriage.

As we mentioned some time ago, Mr. Thomas Prideaux, of Sheffield, has been exhibiting blocks of concrete, mouldings, artificial stone slabs for hearthstones, and other objects, all made from this refuse gas-lime; and as it is now the subject of a patent, and promises to furnish a useful material for building purposes, a short account of the results obtained up to this time may be useful. The gas-lime is ground under edge stones, and presents at first a uniform green color. In this state it forms the raw material for making plaster or cement of various qualities and capabilities. According to the purpose required, it is used in this state, or it is calcined and reground and mixed with silicious matters. A wall may be covered with a smooth coat, which hardens free from cracks, for interiors; basements may be covered with a dry coat of cement, impervious, it is asserted, to damp, and quite obnoxious, be it remarked, to cockroaches. A hearthstone may be

formed, and sets in a few days into a hard block of stone, as well as mantel-pieces and jambs, which, without any coloring matter, present a neat and stonelike appearance.

It is remarkable that the peculiar odor of the gas-lime is no longer to be detected when the cement has set. The sulphur compounds are oxidised rapidly, and some of the adhesive qualities of the cement are no doubt due to the formation of calcium sulphate or plaster of Paris throughout the mass of the material in the process of hardening. A rubble wall can be built up and plastered over to resist the action of water in the interval of a tide, as the properly prepared cement will set even under water. The latter property has induced Mr. Prideaux to propose its use for building sea-walls.

Mr. Baker, of the County Analyst's Office, informs us that a number of houses in Sheffield, where trial has been made of this material, have been visited and inspected since its first application to walls, floors, and hearthstones, now about twelve months ago, and that time only appears to tell in favor of its durability.—*London Builder, May 7*, 1870.

New York Society of Practical Engineering

This society held its usual monthly meeting in the Cooper Union, on the evening of May 18, the President James A. Whitney, in the chair.

The regular paper by J. Harrison, Esq., treated of the Management of City Streets and Sewers.

New York has upwards of 200 miles of sewers, most of them in a defective condition and with openings below high tide; this being especially the case at Canal street and the more depressed portions of the island. This involves the deposit of sand and mud to choke the sewers; the filtration of foul water through the walls of neighbor's basements, and the escape into the atmosphere of streets and dwellings of noisome gases. These latter are shown by analysis to consist of some 76 per cent. of light carburetted hydrogen, 16 per cent. of carbonic acid, 10 per cent. of nitrogen, and appreciable quantities of sulphuretted hydrogen, and a peculiar organic and offensive emanation, capable of causing putrid fevers and similar fatal disorders. The remedy for the existing defects in the sewerage of the city, proposed by the writer, lay in the adoption of a second or supplemental system below the present one, and capable of having its contents removed by pumping apparatus worked by steam. The upper or present tier of sewers could be used simply for the drainage of surface water, as were the whole of the London sewers until the last years of the previous century.

The sub-system of sewers has, indeed, been proposed for the relief of the London sewers which, sewers proper and branch-drains together, embrace a length of about 2000 miles, and which are subject in the same manner, but greater degree, to those of New York. This double system of sewers would also give the additional advantage of keeping the sewage in a less dilute condition in case it was utilized for manure. The possible advantages arising from this last were referred to by the writer, who spoke of the agricultural lands around the city of Edinburgh, which from being valueless have been made worth £520 sterling per acre by the judicious application of sewage. The cost has been from 10s. to 14s. English per acre annually, and in some meadows, in a single season, successive cuttings gave an aggregate growth of grass equal to ten feet high and upwards.

Pavements should be made with a view to sanitary conditions as well as to convenience of transit. The sub-bed or foundation should be practically impervious both to gases and liquids. This will prevent the escape of foul vapors from the soil below, or from crevices in the walls of the sewers, and from the leaky joints of gas mains; also the retention of liquids surcharged with noxious matter from the surface of the street. Such a foundation can be found in the concrete, used and condemned many years ago in England for a pavement by itself, but well adapted to support a pavement of better material. For the last mentioned, wooden blocks treated with antiseptics, furnish the essentials of noiselessness, foothold for draught animals, and smoothness for the wheels of vehicles, but should be laid on a concrete bed, as experience has shown that simply laying the blocks upon the soil, is liable to cause the pavement to sink in hollows, destroying its smoothness, and permitting the accumulation of dirty water, the fermentation of which evolves gases similar to those from sewage matter.

Correspondence.

[Correspondents in all cases should sign their communications with their names and address in full, not necessarily for publication, but as a guarantee of good faith.—Eds.]

Commendatory.

London, Ontario, May 18, 1870.

Messrs. Editors: I have been very negligent in my payments, but not so in reading your most interesting Journal. Please find enclosed the money in payment of the enclosed account for subscription to 2nd July next. By your returning the account receipted you will oblige, Yours very truly,

Edward Glackmeyer.

[Will not some others of our subscribers accept this as a reminder?—Eds.]

Complimentary.

Office of "American Grocer,"
162 William st., New York, May 20, 1870.

Messrs. M. L. Callender & Co.

Gentlemen; Your esteemed favor of 19th inst., with notice of our journal enclosed is at hand, for which please accept our thanks.

While expressing our obligations for your kind wishes for our success, allow us to express our high appreciation of your journal, and to extend to you our good wishes for its success.

With respect, yours truly,

John Daly & Co.

An Explanation Required.

Englewood, Bergen County, N. J.,
May 9, 1870.

Messrs. Editors: Please explain the chemistry of the following. About four weeks ago, while working in the purifying room at the gas-works here, my pocket-book containing some new treasury notes fell out of my pocket. I put it on one of the trays in the purifier I was then filling, and a short time afterwards, having forgot all about it, covered it with lime and started the gas on. I afterwards missed the same and remembered where it was; I concluded to let it remain until the gas was turned off again; this happened a few days ago, and I found that greenbacks are not fast colors. There was not the slightest trace of green about any of the notes; in fact they have been changed to a brown. Years ago I saw the same effect on an atlas I kept in an office adjoining the purifying room.

Yours truly,

Thomas T. Tasker.

[Our impression is that the green used is ordinary Paris green (*arseniate of copper*). In the first issues of so-called "greenbacks," the green *on the face* of the notes was a chrome-green, while that on the backs was the ordinary arsenical or Paris green. The action of the atmosphere of sulphide of ammonium of the purifier on Paris green would be to turn it brown by the formation of sulphuret of copper.—Eds.]

Law Relating to Gas Companies.

Office Brookline Gas-Light Company,
Brookine, Mass., May 21. 1870.

Messrs. Editors: The Massachusetts Legislature has just enacted a new Corporation Law. I enclose that part which relates to Gas-Light Companies. You can use it as you see fit. Yours respectfully,

F. C. Sherman.

[official.]

COMMONWEALTH OF MASSACHUSETTS

Chapter 224.

An Act Concerning Manufacturing and other Corporations.

Be it enacted by the Senate and House of Representatives, in General Court assembled, and by the authority of the same, as follows:

Sec. 2. For the purpose of making and selling gas for light in a city or town, ten or more persons may associate themselves, with a capital of not less than five thousand, nor more than five hundred thousand dollars.

GAS-LIGHT COMPANIES.

Sec. 55. In any city or town in which a gas company exists in active operation, no corporation shall be organized for the purposes set forth in section five of this act, unless the parties to the association are inhabitants of the place; nor unless the existing corporation has realized an annual dividend of seven per cent. on its capital stock for a period of five years.

Sec. 56. Such corporation may, with the consent in writing of the mayor and aldermen or the selectmen, dig up and open the grounds in any of the streets, lanes, and highways, of such place, so far as is necessary to accomplish the object of the corporation; but such consent shall not affect the right or remedy to recover damages for any injury which shall be caused to persons or property by the doings of such corporations. They shall put all such streets, lanes, and highways, which are opened, into as good repair as they were in when opened; and upon failure so to do within a reasonable time shall be deemed guilty of a nuisance.

Sec. 57. The mayor and aldermen or selectmen of a place in which pipes or conductors of such a corporation are sunk, may regulate, restrict and control all acts and doings of such corporation which may in any manner affect the health, safety, convenience or property of the inhabitants of such place.

Sec. 58. Any manufacturing, machine, or other company, having its place of business in any place into which it is proposed to introduce the manufacture of gas for light, may hold not exceeding ten per cent. of the stock in such gas-light company.

What a Subscriber Thinks a Copy of the Journal is Worth.

Rockford Gas-Light and Coke Co.,
Rockford, Ill., May 23, 1870.

Messrs. Editors: I wrote some time since for March 16th number, which was missing, but has since come to hand; the numbers for May 2nd and 16th I have not received which please let me have, as I feel completely at a loss when the Journal does not come to hand, as there is always something in them to suggest new ideas to my mind, worth more than ten times the price you charge. Yours respectfully,

Thos. Butjerworth, Pres.

[The Journal is always sent regularly. Is not the difficulty at the delivery end of the line.—Eds.]

Monthly Report of the Hartford Steam Boiler Inspection and Insurance Company.

The above-named company makes the following report of its inspections for the month of March:

During the month, 458 visits of inspection have been made, and 784 boilers examined, 731 externally and 224 internally, while 69 have been tested by hydraulic pressure. The number of defects in all discovered were 482, of which 60 are regarded as dangerous. The defects in detail are as follows: Furnaces out of shape, 7—1 dangerous. Fractures in all, 30—7 dangerous. Burned plates, 73—15 dangerous. Cases of incrustation and scale, 31—12 dangerous. Cases of sediment and deposit, 5 Cases of external corrosion, 34—four dangerous. Internal corrosion, 6—5 dangerous. Cases of internal grooving, 8—1 dangerous. Water-gauges out of order, 25. Blow-out apparatus out of order, 7—1 dangerous. Safety-valves overloaded, 24—1 dangerous. Pressure-gauges out of order, 92—2 dangerous. These varied from —10 to +25. Tubes corroded off near tube-sheet, 1—dangerous. Boilers malconstructed, 1—regarded as dangerous. Boilers condemned as unsafe and beyond repair, 4.

A large number of leaky boilers were reported; some had become so from blowing down, and immediately filling up with cold water. This practice will ruin the best boiler in a short time. Before refilling, the boiler should be allowed to become quite cool. The accumulation of sediment about the tubes, keeping the water therefrom, is a great source of evil; tubes become burned and corroded, and leaks will of necessity follow. Steam-gauges, it will be noticed, have been found out of order in numerous instances. There is no way of ascertaining these variations, except by frequent tests; and although they may be light in many instances, in some they are positively dangerous; for instance if a boiler is being run by the gauge at a pressure of 85 lbs., and the gauge is 10 lbs. "heavy" or "slow," the actual pressure used is 105 lbs., which may be far beyond the safe limit. Hence it is important that these indicators should be often examined. We have not space for further comment; but intelligent engineers will see that the boilers under their care are free from the defects and dangers enumerated above.—*Artisan.*

Recent American Patents.

Pertaining to Gas, Water, Etc., from the 7th to the 14th May, 1870.

192,511.—Pump.—Thomas De Witt, Detroit, Mich., assignor to John T. Moxson, De Witt, Iowa.

102,522.—Sectional Steam Generator.—H. W. Evans, Philadelphia, Pa.

102,552.—Lamp Burner.—J. H. Johnson, Newark, N. J., assignor to Holmes, Booth & Haydens, Waterbury, Conn.

102,571.—Water Meter.—William McGinniss, Auburn township, Ohio.

102,581.—Boiler Furnace.—J. A. T. Overend, San Francisco. Antedated April 23, 1870.

102,624.—Faucet.—W. H. Triscler, Cleveland, Ohio.

102,634.—Pump.—J. T. Whipple, Chicago, Ill.

102,655.—Water Elevator.—Geo. C. Canfield, Mechanicsburg, Ohio.

102,664.—Pump Valve.—J. W. Douglas (assignor to W. & B. Douglas), Middletown, Conn.

102,674.—Lamp Burner.—S. W. Fowler, Brooklyn, N. Y., assignor to A. C. Hodgman.

102,728.—Lamp Burner.—Alvin Taplin, Forestville, assignor to Bristol Brass and Clock Co., Bristol, Ct.

102,743.—Pump.—F. C. Wilson, Watkins, N. Y.

102,768.—Rotary Pump.—Richard Bush, Brooklyn, New York.

102,784.—Gas Generator.—Ellis Doty, Janesville, Wis., assignor for one half his right to Thomas Judd.

102,819.—Apparatus for Distilling Hydrocarbon Oils.—S. A. Hill and C. F. Thumm, Oil City, assignors to themselves and O. P. Scaife, Pittsburgh, Pa.

102,897.—Lamp Burner.—H. J. White, Boston, Mass.

102,900.—Water Wheel.—Truman Bristol, Cheshire, assignor to himself and Chas. Monson, New Haven, Conn.

102,939.—Water Wheel.—William H. Hubbard, New Haven, Conn.

102,948.—Hydraulic Engine.—A. D. Laws, Bridgeport, Conn.

102,955.—Water Elevator and Carrier.—Archibald A. McPheeters and R. P. McPheeters, Arbor Hill, Va.

102,065.—Feed Water Heater.—William Phelan, Peoria, Ill.

102,976.—Water Meter.—Gerard Sickles, Boston, Mass.

REISSUES.

3,950.—Steam Gas Generator.—H. S. Maxim, New York city. Patent No. 71,400, dated Nov. 26, 1867.

RECENT ENGLISH PATENTS.

[From the London Artizan, May 1, 1870.]

844.—Increasing the efficiency of Steam Generators.—D. Joy.

850.—Producing Motive Power.—C. J. Eyre.

873.—Steam Engines.—A. Baumann.

928.—Artificial Fuel.—J. H. Johnson.

838.—Lubricators.—C. D. Austin.

961.—Illuminating Oils and Solid Hydrocarbons.—F. Field and G. Siemseen.

976.—Utilising Exhaust Steam.—J. Shakleton.

999.—Removing deposits from Steam Boiler Flues.—E. Green.

1005.—Gas Lamps.—T. Ford.

1030.—Indicating the water level in Steam Boilers.—E. Daniel.

1063.—Steam Engines.—R. Wilson.

1064.—Centre Valves for Gas Purifiers.—C. C. and W. T. Walker.

French Experiments with Liquid Fuel.

For more than ten years M. H. St. Clair Deville has been experimenting with mineral oils as fuel. *Comptes Rendus* and *Le Journal l'Eclairage au Gaz*, have lately published some interesting facts in regard to those experiments, a *resume* of which is our present purpose.

The oils employed have been obtained from various natural sources, and the experiments have also included the heavy oil from the Parisian Gas Company's works. The experiments have determined the following points: In twelve kinds of crude oils analyzed, there was found to be from 82 to 87·1 per cent of carbon, 7·6 to 14·8 per cent of hydrogen, and 0·9 to 10·4 per cent of oxygen.

The heavy oil of the Parision Gas Company has a specific gravity at 42° Fah. of 1·045, and at 88° Fah. 1·007. It is of a dark brown color, and contains 82 per cent of carbon, 7·6 per cent of hydrogen, and 10·4 per cent of oxygen, nitrogen, and sulphur. Heated to 421° Fah., only 12·5 per cent volatilizes. It remains fluid ot 12° Fah. A tun of it contains about 220 gallons, and its cost is about fifty francs per tun, or in round numbers $10 in gold, our currency.

The amount of carbon added to the hydrogen contained in this fuel, must make it a very powerful heat-generating combustible. It has nearly the lowest expansibility of all the oils, its coefficient of expansion being 0·000743, and the lowest coefficient being 0·000652.

The most important experiments with the heavy oil were made with a locomotive of the Strasbourg Railway Company. This locomotive has uncoupled wheels and outside cylinders. Its weight is twenty tuns, and that of the tender is fifteen tuns. It has a heating surface of 72 square yards. The oil was supplied to the furnace from a tank, being fed by its own gravity. An additional supply was carried on the tender, wherewith to renew the supply in the tank as required.

The fire was kindled by lighting some shavings and sticks on the floor of the fireplace, and at the same time admitting a small quantity of oil. A jet of steam was sent into the smoke pipe from the blow-off pipe of another engine to increase the draft. It took an hour and a quarter to get up steam, during which time 11 gallons of oil were consumed. It was shown, however, that by consuming 12¼ gallons of oil, steam could be got up in two and one half hours, without assistance from another engine, but with the inconvenience of a large amount of dense black smoke.

On the first experimental trip it was found that a speed of 40 miles per hour was obtained with a consumption of about 14 lbs. of oil per mile. In a second experiment a train of 70 tuns was drawn at a speed of 40 miles per hour, with a consumption of about 17 lbs. of oil per mile. Subsequent experiments gave results not differing essentially from those mentioned.

The grate consists of twenty bars of iron cast in one piece, with channels for the oil to run down, and it is set perpendicularly before the furnace, which is lined with fire brick. A separate cock supplies oil to each grate bar. It is thus seen that with the heavy oil, steam can be got up in about the same time as with coal; the combustion of the oil is not specially difficult to control; and that the consumption of oil, as compared with that of coal, is only about one half by weight. It is stated that the fire brick used to line the furnace suffered severely from the intense heat, but the effect upon the tubes, etc., of the engine do not seem to have been yet noted.

These experiments do not give much encouragement that liquid fuel will ever be adopted, except in special cases. The price of such fuel could not be kept at its present figure were it in general demand for this purpose, and therefore its use would not probably result in any economy over that of the best coal.—*Scientific American.*

Important to Oil Men.—The Commissioner of Internal Revenue has decided that men who own oil lands or hold them under leases, and who sink wells therein and work them until they are exhausted, and then sink others in the same manner and for the same purpose, may be allowed to deduct the cost of sinking such wells in their income returns; that in such case the business seems to be the production of oil for sale, and the expense of sinking the wells, which are worthless when they are exhausted, is one of the necessary expenses of conducting it. He decides, however, that no such deduction should be allowed to men who sink wells not for the purpose of working them, but for the purpose of thus improving the oil lands and then selling them thus improved; that in this case the expense of sinking the wells is as much an investment as though it were expended in erecting a house on the same lands, and should be governed by the same rules.

Prevention of Boiler Incrustation.—A very simple mode of preventing boiler incrustation is in general use at the Darmstadt Gas Works. The engine has worked day and night since 1854, almost without interruption, and the formation af calcareous deposits has been entirely prevented by the use of crude pyroligneous acid, combined with tar; it is either introduced into the boiler or mixed with the feed water. Since this mixture has been in use they have never had a stoppage through incrustation, and have never had to use a hammer to remove scale. Each year, during the summer, when less gas is required, the boiler is opened, and perhaps a couple of handfuls of loose sediment taken from the bottom. The quantity employed is very small—just enough to redden litmus paper; consequently the iron is not attacked, as indeed is apparent from the fact that the boiler has been but twice under repair.

Cost of Lighting the City of Boston.—The following item shows the cost of lighting the city of Boston for last year: There are 75 men employed on the city street lamps. The number of gas lamps at the present time in the whole city is 4,769, and the number of fluid lamps is 1,244. Last year 312 gas lamps were added and 47 fluid. This great increase in one year was owing to the relighting of the Church street district and the widening of so many streets. It is reckoned that each lamp burns during a year 3,800 hours, at the rate of one cent per hour for four feet of gas. A person passing along the streets little thinks of the great expense of their illumination; yet last year the sum of $276,064 71 was appropriated for this object.

Gas Item.—At Selma, Alabama, we understand the Gas Works are being rebuilt. The connections are increased from four inch to six inch. A new gasholder is being built 50 by 16; also new purifiers and retort house, containing four benches of threes. R. T. Coverdale, of Cincinnati, is the contractor to make the alterations.

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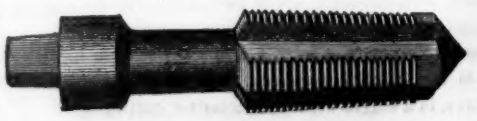
NOTICE.—WILL CHARLES GREENE, WHO had an Electrical Engine on exhibition at the late Mechanics' Institute Fair in this city, please send his address to the Editors of this Journal, and oblige.

Will CHARLES JONES of Philadelphia, who sent us a comunication a few weeks ago, about Hydrogen Gas Apparatus, please communicate his present address.



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will be furnished on short notice.

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Agent for the New England States, for the sale of the

Delaware, Lackawana, and Western Railroad Company's Scranton Coal.
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2 -1

THE NEWBURGH
ORREL COAL COMPANY,

Mines at Newburgh, Preston County, West Va.
Company's Office, No. 52 S. Gay street, Baltimore, Md.
C. OLIVER O'DONNELL, Pres't. G. W. MAHOOL, Sec'y.
CHAS. W. HAYS, Agent in New York, Room 7, Trinity Building, 111 Broadway.
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This Company offer their very superior Gas Coal at lowest market prices.
It yields 10,996 cubic feet of gas to the ton of 2,240 lbs., of good illuminating power, and of remarkable purity; one bushel of lime purifying 6,792 cubic feet, with a large amount of coke of good quality.
It has been for many years very extensively used by various Gas Companies in the United States, and we beg to refer to the Manhattan, Metropolitan, and New York Gas Light Companies of New York; the Brooklyn and Citizens' Gas Light Companies of Brooklyn, N. Y.; the Baltimore Gas Light Company of Baltimore, Md., and Providence Gas Light Company, Providence, R. I
The best dry coals shipped, and the promptest attention give to orders. 224-1

THE DESPARD COAL COMPANY

OFFER THEIR SUPERIOR

DESPARD COAL

To Gas Light Companies throughout the country.

Agents, PARMELEE BROTHERS, No. 32 Pine street, N. Y.
BANGS & HORTON, No. 31 Duane street, Boston.

Mines in Harrison County, West Virginia.
Wharves, Locust Point, } Baltimore.
Company's Office, 29 South street, }

Among the consumers of Despard Coal, we name: Manhattan Gas Light Company, New York; Metropolitan Gas Light Company, New York; Jersey City Gas Light Company, N. J.; Washington Gas Light Company; Portland Gas Light Company, Maine.

*** Reference to them is requested. 204-1y

West Fairmount Gas Coal Mines.

HENRY Y. ATTRILL, Proprietor.

Mines at Fairmount, Marion Co., West Va.

Oliver Jackson, Esq., Pres. First National Bank of Fairmount, Manager.

Wharves, Hankey's Locust Point, } Baltimore, Md.
Office, 35 S. Gay-street, }

I offer this superior coal to Gas Companies throughout the United States—SUPERIOR TO ANY. See analysis by Engineer Manhattan Gas Light Company of New York in the "Gas-Light Journal" vol. X., No. 218, p. 217. Orders solicited from Gas Companies, Gas Manufacturers, and shippers of Coal by the cargo.

This coal, by analysis of Jos. A. Sabbaton, gave a yield of 9,681 cubic feet, and 9,500 cubic feet to the ton with an ILLUMINATING POWER OF 19.50 CANDLES, AND 40 BUSHELS COKE. 215-3m

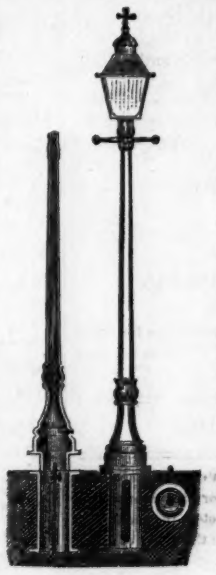
FAIRMONT GAS COAL COMPANY OF NEW YORK.

Mines at Fairmont, Marion County, West Virginia.
Office, 47 Exchange Place, New York.
A. N. MEYLERT, President. HIRAM BENNER, Sec'y and Treas.

THIS COAL IS OF VERY SUPERIOR QUALITY, with an illuminating power of 19 candles, yielding over 10,000 cubic feet of gas to the ton, and an excellent coke.
The orders of Gas Companies solicited. 283-tf.

BRANSON'S PATENT LAMP POST

THE ADVANTAGES OF THIS PATENT POST over the old style, are as follows:



1st. The saving of the base or bottom part of the Post, when the column is broken, the Post being made in two parts. The broken column can be replaced by a new one, without disturbing the base.

2d. When the old style of post is broken, the bottom piece has to be dug out, which cannot be done in winter, or in wet weather: all this is obviated in this Post, as no digging is required. This style of Pos is especially desirable when flag stone sidewalks are used.

3rd. When a stoppage of gas in stand pipe occurs, the column can be lifted out, the pipe detached, cleaned, and replaced in fifteen minutes; no digging being required as is now done with the old Post.

4th. A lighter and better casting can be made from this patent, and it can be handled better, owing to its length and lightness.

5th. In case a broken column cannot be repaired, one third of the original cost is saved by the base being secured and perfect.

Rights for States, or the United States, on reasonable terms. Address, Editors GAS-LIGHT JOURNAL, 42 Pine street, N. Y.

Certificate.

ST. LOUIS, September 1, 1869.

I have examined a new Lamp Post, the Branson patent, and unhesitatingly pronounce it to be the best thing of the kind I have ever seen. Posts of this description have been erected in this city, and in my opinion this style of Post should be universally adopted, as I believe it possesses all the advantages claimed for it.

The St. Louis Gas-Light Company have adapted this Post and ordered a large quantity for immediate use.

THOMAS PRATT,
537-6m Sup. St. Louis Gas Works.

THE FAIRMONT GAS COAL CO. OF NEW YORK.

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Mines at Fairmont, Marion Co., W. Virginia.

THE FAIRMONT GAS COAL COMPANY OF New York, solicit the orders of Gas Companies for their VERY SUPERIOR GAS COAL.

The Coal from their Mines is remarkably free from sulphur.

For Gas Companies our Coal is carefully screened and shipped, free of slate and other impurities.

This Coal has an illuminating power of 19 candles, yielding over 10,000 cubic feet of gas to the ton, and a large amount of excellent Coke.

Refer to the Manhattan Gas-Light Company, New York, and the New York Gas-Light Company, New York.

HIRAM BENNER, Sec. and Treasurer. A. N. MEYLERT, President.
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GAS AND KEROSENE FIXTURES

THE TUCKER MANUFACTURING CO.

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MANUFACTURERS.

Offer the largest variety of New and Handsome Designs of GAS and KEROSENE FIXTURES to be found in any establishment in the country, comprising in both lines an unusual variety of large and massive Fixtures, especially adapted for Churches, Halls, Hotels, Stores, and other Public Buildings, together with a large variety of patterns suitable for dwellings. 245

BUTLER'S
Patent Gas Works.

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OIL AND ROSIN GAS WORKS (all sizes) for Towns, Factories, Plantations, Churches, and Private Dwellings. These Works are warranted to make cheaper gas than any small Works known, and are very simple to manage. Refer to *over three hundred now in use from one to thirteen years.*

Estimates furnished for cost of Works, and the cost of manufacturing Gas in various localities.

Send for descriptive pamphlet.

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AND

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At No. 42 Pine Street, New York.

M. L. CALLENDER & CO.,

EDITORS AND PROPRIETORS.

Consulting Chemist,
Geologist and General Scientist,
PROFESSOR HENRY WURTZ.

[NOTE BY PROFESSOR WURTZ.—Contributions and items for which I am, as a Scientist, individually responsible, will have attached my full name or initials.—H. W.]

THURSDAY, JUNE 2, 1869.

WISHING TO MAKE this Journal an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit letters from all among them who make the study of these objects a pleasure, or a profession.

Subscribers would confer a favor upon us by remitting *CHECKS* or *POST OFFICE MONEY ORDERS*, as we are frequent losers where money is enclosed in letters.

☞ NEWS AGENCY.—The American News Company, 119 and 121 Nassau street, New York, are agents for this Journal. News-dealers will please send orders to them.

NOTICE.

☞ *All Collections for Advertisements, Subscriptions, etc., are made directly from this Office. We have Agents to solicit the same, but they are not authorized to Receipt for Money.*

TO OUR SUBSCRIBERS AND PATRONS.

In making remittances for subscriptions, always procure a draft on New York, or a POST OFFICE MONEY ORDER, if possible. Where neither of these can be procured, send the money, but always in a REGISTERED LETTER. The registration fee has been reduced to fifteen cents, and the registration system has been found by the postal authorities to be virtually an absolute protection against losses by mail. ALL Postmasters are obliged to register letters whenever requested to do so.

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PATENTS.

M. L. CALLENDER & CO., Proprietors of the AMERICAN GAS-LIGHT JOURNAL, AND CHEMICAL REPERTORY offer their services to inventors as Solicitors of

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Solicitors of Patents, 42 Pine street.

CHEMICAL ANALYSIS OF THE GAS OF THE HARLEM GAS-LIGHT CO.

[*Made altogether* from the MURPHY RUN COAL, of West Virginia; and purified by the improved process of ST. JOHN and CARTWRIGHT.]

By Professor HENRY WURTZ, of New York.

The gas analyzed was obtained at the station of HARLEM GAS-LIGHT COMPANY, in One Hundred and Eleventh street, on the 2d of May, 1870. It was collected by displacement, by passing a strong and rapid stream of the gas through a tube reaching to the bottom of an inverted French stoppered bottle which had been carefully selected, and the stopper of which was smeared, before insertion, with some thick glycerine. This gas had been purified with ST. JOHN and CARTWRIGHT'S iron preparation, and hence, as was to be expected, from the well-known great power of this preparation over sulphur, there was no action whatever on the sulphur test-paper. Carbonic acid, however, still remained. Ammonia was also present to a small extent. The samples thus secured were taken to the splendid gas laboratory of the MANHATTAN COMPANY, in Eighteenth street, and transferred there to BUNSEN eudiometers, over quicksilver. These eudiometers had previously been carefully calibrated.* For transferring, without loss, or introduction of air, I used the arrangement described by BUNSEN on page 12 of his *Gasometry*. On one such portion the carbonic acid and oxygen and illuminant hydrocarbons were determined, by successive absorption with caustic soda, alkaline pyrogalline and Nordhausen acid. From another portion the illuminants were first absorbed by Nordhausen acid (leaving the O and CO^2 in the gas), and then a portion of the residue transferred to another eudiometer, mixed therein with measured volumes of air and oxygen, exploded by the spark, and the proportions of hydrogen, marsh-gas, carbonic oxide and nitrogen determined from the measurement of the products. In the first operation, of which I shall omit the details, the results were:

Carbonic acid, in 100 volumes — 1.18 vols.
{ Oxygen " " " — 0.38 " }
{ Equivalent to air " " — 1.82 " }
Illuminant Hydrocarbons in 100 volumes — 5.03 "

Of the second operation, the following tabulations are presented, of all the measurements, reductions, and results. Though in these analyses, the general method followed was that of BUNSEN, yet new instruments and especially numerous new manipulations were employed, which have been recently devised by Prof. SILLIMAN and myself, and which we regard as very great improvements, in ease and rapidity as well as accuracy. The description of these is reserved for a future occasion.

	Millimeter Readings.	Inches of Barom.	Therm. Fahr.	(Reduced for Calibr. and for Tem. and Pressure.
Original Volume	431.0	30.37	67°.8	431.0
After Nordhausen	409.0	30.35	66°.7	409.9

Absorption 21.1
Corresponding to Illum't Hydrocarbons — 4.89 p. c.
Former determination of " " — 5.03 "
Mean — 4.96 "

1. Partial Volume taken from residue of above	102.5	29.91	78°.0	102.50
2. After adding Air	816.5	29.91	78°.3	816.32
3. After adding pure Oxygen	440.5	29.91	78°.5	440.10
4. After Explosion, and removal of the water formed	276.0	29.90	74°.0	275.88
5. After absorption of the Carbonic Acid formed, by Soda	229.0	29.90	75°.0	228.05
6. Residual Nitrogen, after absorption by Pyrogalline	174.5	30.07	78°.0	175.43

* It may be explained, for the information of those who are not analysts, that the divisions of a eudiometer tube are only measures of *length*. Their relative *volume* depends upon the varying *calibre* of the tube. Hence the need of laborious calibration, and subsequent correction of every reading by a *calibration table* made for each eudiometer.

After measurement (5), through an accident 2.5 mm. of air was let into the tube, but being at once detected and measured, it is taken into account in the subsequent calculations, and introduces no error. From the above the following figures are deducible.

Total air added (+2.5 mm. leaked in) — 216.32
Oxygen in this air — 45.40
Steam Condensation, after Explosion — 164.72
Soda Absorption, after Explosion — 47.33
Pyrogalline " " " — 52.62

Oxygen Estimates.

Oxygen in the Air added — 45.40
" added pure — 123.78
" in contaminating air (by previous analysis) — 0.41
Total — 169.59
" absorbed by pyrogalline — 52.62
" consumed in all — 116.97....(O)

Nitrogen Estimates.

Nitrogen in air added — 170.92
" in contaminating air — 1.64
Total — 172.56
" residue from pyrogalline — 175.43
Total — 2.87
" free, in original gas — 1.23

Original volume, consisting of $H+C^2H^4+CO+CO^2+N+O$ — 102.50

N, in this, by direct determination, as above — 2.87
O, calculated on whole volume from previous determination — 0.41
CO^2, calculated on whole volume from previous determination — 1.27
Total — 4.55

Therefore the $H+C^2H^4+CO$ — 97.95....(S).
Carbonic acid from the explosion, found by deducting that originally in the gas (47.33—1.27) — 46.06..(CO^2)

Now, according to the formulae of BUNSEN, (*Gasometrg*, p. 112)

$$H = S - CO^2 \quad ; \quad C^2H^4 = \frac{2O - S}{3}$$

and $CO = CO^2 - C^2H^4$

Therefore the 97.95 of mixed gases calculated above is made up of

Hydrogen — 51.89
Marsh Gas — 45.33
Carbonic Oxide — 0.73

And if we calculate the illuminants as restored to the above volume of 102.5 mm. which was burned in the explosion ($\frac{4.96 \times 102.5}{95.04}$ —5.36) we shall have the figures in the first column below, as the actual results of this analysis, which in the second column I have reduced to 100 parts.

		By Centesimal Reduction	Bunsen's Analysis of a Cannel Gas. (Bunsen p. 118).
Hydrogen	51.89	48.06	45.58
Marsh Gas	45.33	42.07	34.90
Carbonic Oxide	0.73	0.67	6.64
Illuminant Hydrocarbons	5.36	4.98	4.08 (Oleft't) 2.35 (" ?)
Nitrogen (free)	1.23	1.14	2.46
Nitrogen (corresponding to air)	1.64	1.53	
Oxygen " "	0.41	0.38	— (undetd)
Carbonic Acid	1.27	1.17	3.67 HS—0.29
	107.86	100.00	100.00

Room fails me for any comments on the results of this very interesting analysis in this issue. I have put alongside of it an analysis by BUNSEN of a cannel gas made in Manchester, for comparison. I shall now merely remark that the main peculiarity of this Murphy Run Coal, shown by analysis of its gas is an almost total *absence of oxygen*, the bituminoid matter being *made up of hydrocarbons.*

To conclude, for the present, a day was spent at the Hundred and Eleventh street Station, chiefly in careful photometric experiments upon this Murphy Run gas. In some of these I used one of the standard candles of the MANHATTAN COMPANY, with one of their standard Argand burners and chimneys, with which, owing to peculiarities of this gas, which will hereafter be explained, I was enabled, notwithstand-

ing the high candle power, to burn five feet of this gas under a pressure of 0.5 inch of water. With the test-burner used by the HARLEM COMPANY, having a larger throat, this could not be done, without reducing the pressure to 0.37 inch. The mean result of the photometry was in excess of EIGHTEEN CANDLES.

I have in progress chemical examinations of the coal itself, the results of which will shortly appear.

HENRY WURTZ.

26 Pine street, New York, June 1, 1870.

NEW SCHOOL OF METALLURGY.

In another co'umn will be found the advertisement of EDWARD N. KENT, of this city, who was for many years melter and refiner in the United States Assay Office, having been associated with Dr. JOHN TORREY (who is still United States Assayer) in the first organization of that important institution.

Mr. KENT has started the new and highly praiseworthy enterprise of a special School of Metallurgy, to impart practical instruction in a branch of science in which the American public is wofully deficient, a deficiency which has cost the said public untold millions. Mr. KENT's high qualifications for the weighty task he has undertaken are indicated both by his former conduction of the stupendous metallurgical operations of the United States Assay Office, and still more by his well known devotion of his entire time and means, since leaving that Office, to the practical study of Metallurgy, in connection with extensive travels through the American Mining districts.—H. W.

☞ We observe the *Scientific Press* (a journal of much merit, published in San Francisco) has in the number of May 14th quoted (without crediting us—inadvertently we presume) from an editorial formerly published in our Journal, a description of the method of manufacturiug Wyckoff's Patent Water and Gas Pipes. It says these pipes are manufactured at Ithaca, N. Y., which is a mistake. They are manufactured at Elmira, N. Y. This piping is what is known as the Wyckoff patent and is manufactured by J. S. Hobbie & Son, who have recently bought out the patentees.

THE SMITH & SAYRE MANUFACTURING CO.— The friends and patrons of this company are hereby informed, that notwithstanding their factory has been burned down, it will cause *no delay* in their business, as they have made such arrangements as enables them to supply all orders entrusted to them, with punctuality and despatch. Address as usual, Smith & Sayre Manufacturing Co., 95 Liberty street, N. Y.

A CHANCE. —We desire to call the attention of gas companies, manufacturers, and especially those West and South, to the advertisement in another column, of Retort House Castings, etc., for sale. This is an excellent chance to obtain a complete gas works, at a very low price.

NEW PUBLICATIONS.

Woodhull & Claflin's Weekly.—The first number of this new weekly paper, issued by the lady brokers of Broad street, has been received by us. It is a neat sixteen-page paper, and gives evidence of talent and aptness in the most difficult of all arts, the art of journalism. It contains stories, essays and poetry; and takes a part in politics, finances, out-door sports and fashions. In accordance with its motto, "Upward and Onward" it advocates woman's rights and go so far as to nominate one of the partners for the next Presidency. The example of Mdmes. Woodhull & Claflin is a highly chmmendable one., as they do more and talk less than those female agitators who waste their breath and their hearer's patience at conventions and mass-meetings.

American Engineer.—This is a new weekly Scientific Journal of eight pages, published in Philadelphia by Messrs. Evans & Co. It is devoted to practical information, mechanics, chemistry, arts and manufactures. In it may be found a full and accurate account of all improvements in machinery, etc., etc. The terms are $2.50 per annum.

The Art Review.—A new monthly, published in Chicago, by E. H. Trafton, 115 Madison street. It is an exponent of art for the people, quarto in shape, printed on tinted paper, beautifully illustrated, containing popular articles on Art, Music and Literature Thoroughly American in its aims: national in its circulation.

Answers to Correspondents.

C. F. H., of Pa.—Olefiant gas is sometimes termed heavy carburetted hydrogen in contradistinction to marsh gas, which is often spoken of as light carburetted hydrogen.

F. A. S., of Ohio.—We learn that Mr. Smedberg is now preparing his "Synopsis of British Gas Lighting," and will shortly place it in the hands of the printer.

G. D., of Ky.—The only English edition of "Gmelin's Handbook of Chemistry," was published by the Cavindish Society of London, whose terms of membership was one guinea per annum. It is an invaluable book to the student, being a complete library in itself.

A. E., of Mo.—We cannot answer your inquiries unless you state your questions more explicitly. As your letter now reads, we think you have taken a wrong view of the whole matter, and we advise you to be careful how you proceed.

J. D., of Ill.—Both terms are correct, but we prefer "gas-holder," as that name designates the use of the apparatus; whereas "gasometer" rather implies a measuring instrument. Most scientific writers on gas have adopted the former term, and it is generally used by practical men.

J H. C., of Conn.—The illuminating power of a candle is greatest as soon after the lighting of the wick as the fat begins to melt and flow freely; and previous to the crusting of the wick. As soon as the latter condition commences the intensity of the light decreases.

F. J., of Pa.—Our advertising columns will inform you of the permanent makers of the article.

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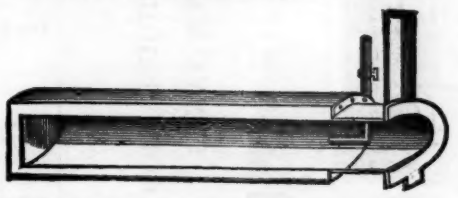

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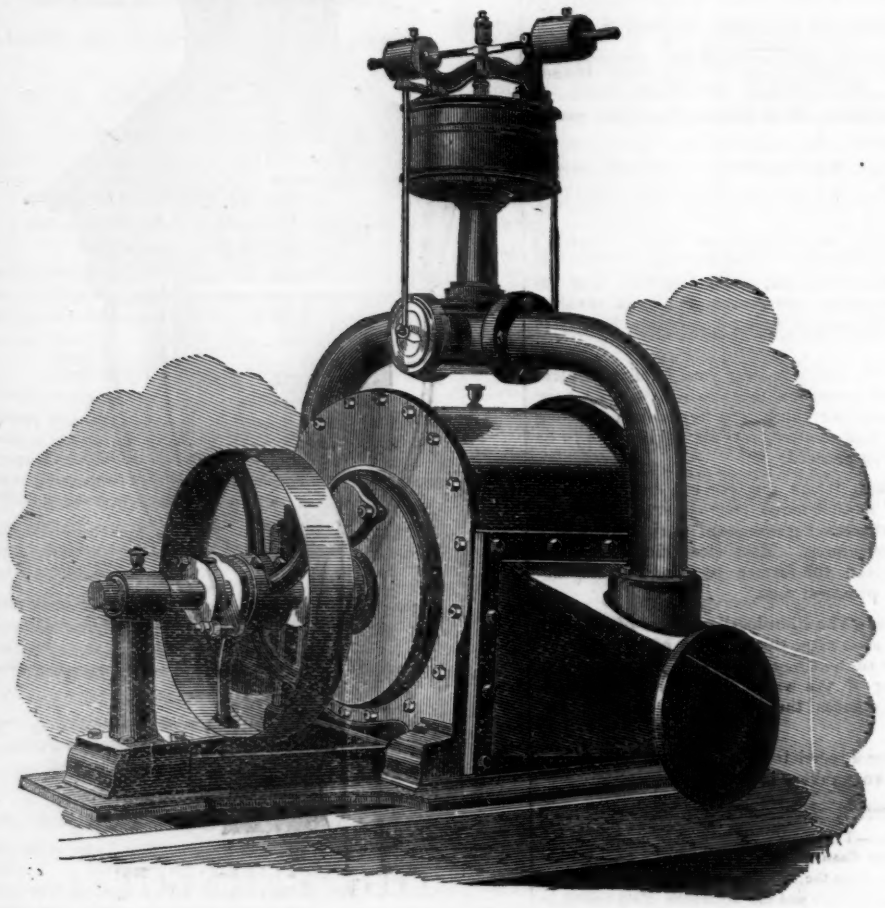

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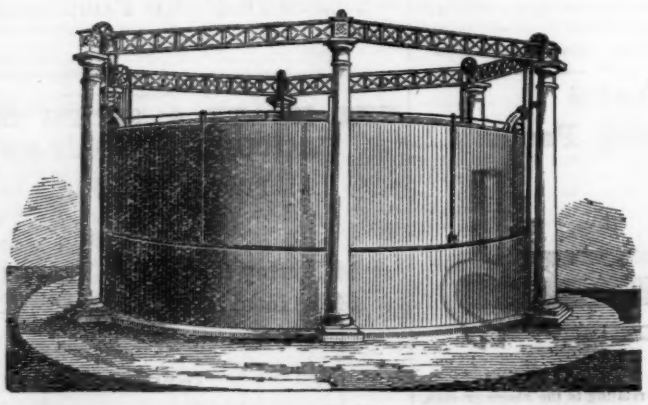

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FIG. 1.

Fig. 1 shows a single gate valve.

Fig. 2 represents wedge and one-half of gate of double valve, intended for larger sizes, when required to bear heavy pressure either side.

Fig. 3, represents a section through body, gate and wedge.

The slides, G G, are held against wedge D, by ribs, H H, projecting from sides of valve body, A.

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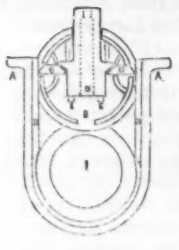

FIG. 3. FIG. 2.

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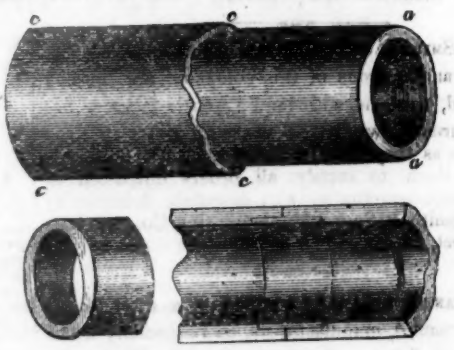

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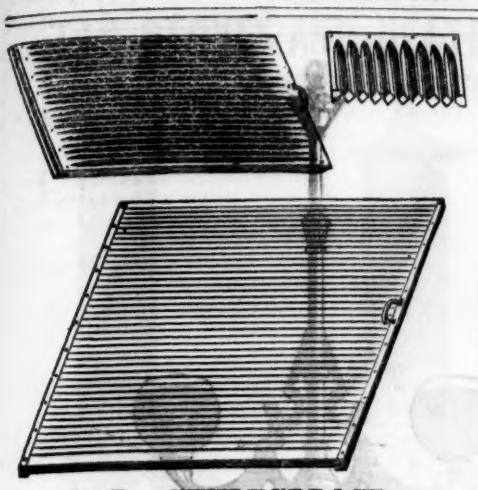

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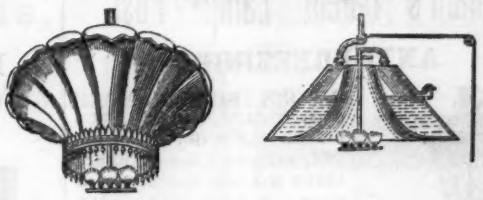

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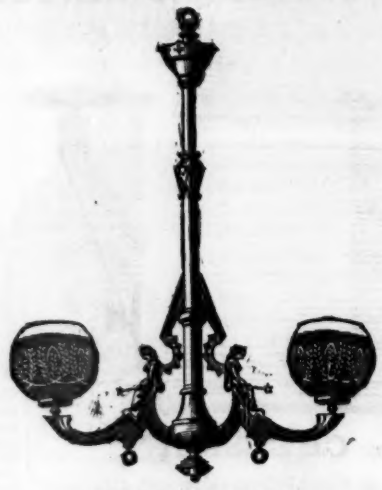

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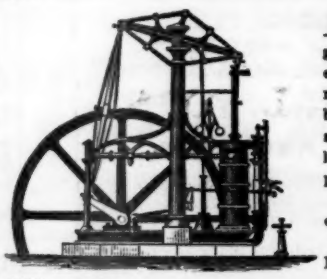

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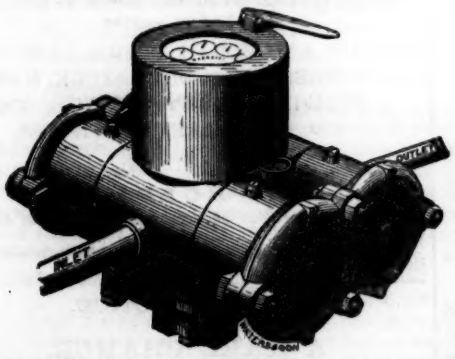

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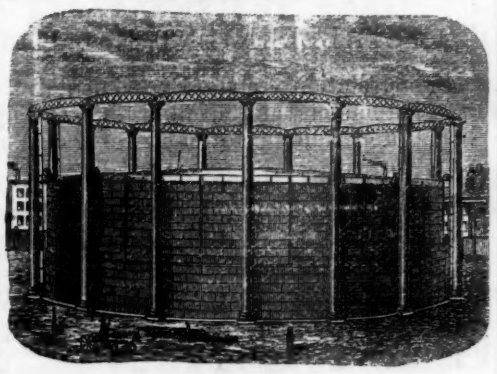

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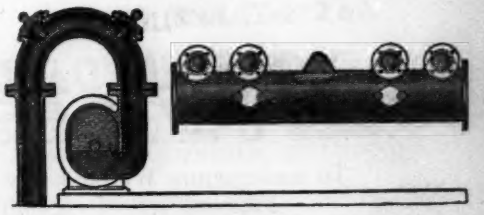

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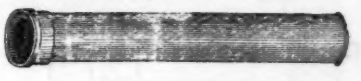

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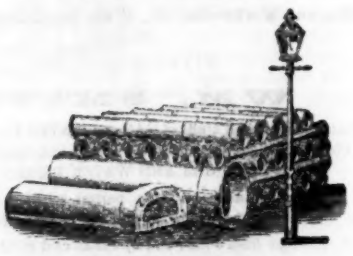

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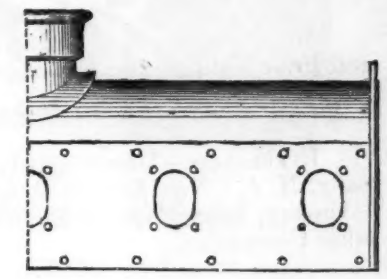

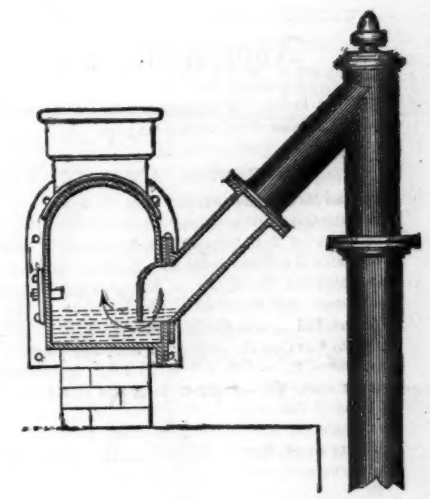

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